SITE: GE ROME
BREAK: 16.1
OTHER:

Pete_Tuttle@fws.gov
09/13/02 10:09 AM

To: Carolyn Thompson/R4/USEPA/US@EPA
cc:
Subject: Lake Weiss PCBs

10091253

Hi Carolyn,
good talking with you yesterday.

Some information on Lake Weiss, PCBs, and fish and wildlife concerns. Hopefully some of this information will be useful for Am.Brass also.

T&E Species associated w/ Lake Weiss
Two bald eagle nests are located on/around Lake Weiss. A nest on Hog Island was first reported in 1994 but apparently has not been used since 1999. The second "Weiss Lake - cotton field" nest was first occupied in 1995 and was still active in 2001 (unsure about 2002). Bald eagles primarily eat fish.

There are also several other listed species in the vicinity. Endangered southern clubshell mussels, endangered ovate clubshell mussels, and threatened fineline pocketbook mussels are found in the Coosa River downstream of Lake Weiss. Threatened blue shiner (fish) are found in Spring Creek and Little River, both flowing into Lake Weiss but have not recently been reported in Lake Weiss or the Coosa River. Endangered Coosa moccasinshell mussels are found in the Chattooga River but not Lake Weiss or the Coosa River.

Endangered Alabama bats and gray bats are also found in the vicinity. Both species feed over water with the diet consisting primarily of semi-aquatic insects emerging from the water.

Two plants, green pitcher plants and Mohr's Barbara's button are found at several sites on the southern shores of Lake Weiss. PCBs likely do not represent a significant threat to these plants.

Fish& Wildlife Toxicity
Fish, wildlife, and invertebrates may be exposed to PCBs in water, sediment, and diet (Eisler and Belisle 1996). Animals readily absorb and accumulate PCBs within the body. PCBs tend to magnify in food chains (e.g., tissue concentrations become increasingly concentrated in successive trophic levels). Animals at higher trophic levels (e.g., bald eagles) may accumulate PCB concentrations that are thousands or even tens of thousands times higher than concentrations found in water or sediment. Because of their association with sediment, bottom-dwelling or bottom feeding aquatic organisms (e.g., endangered mussels, aquatic insect larvae) may also be subject to higher levels of exposure and accumulation. Again, animals feeding on benthic organisms (including aquatic insects emerging from the water) may subject to exposure and accumulation of PCBs.

PCBs have been associated with a variety of toxic effects in animals, including biochemical changes, immune system suppression, altered behavior, tissue damage, reduced reproduction, impaired growth, developmental effects, low birth weight, birth defects, and reduced survival (Hoffman et al. 1996). Differences in chemical structure result in differences in toxicity among the various PCB compounds. In general, embryos and juvenile are more sensitive to effects of PCBs (Eisler and Belisle 1996). PCBs have been associated with cancer in laboratory tests (Niimi 1996). However, there is no clear evidence of increased incidence of PCB- induced cancers in naturally-occurring fish and wildlife populations. PCBs have also been reported to mimic the action of the hormone estrogen in animals (Walker and Peterson 1992). Exposure to low concentrations of PCB may trigger biological responses, such as inhibition of sperm production or development of secondary female characteristics, which are normally attributed to the hormone estrogen. Because PCB concentrations causing developmental or reproductive effects in fish and wildlife are typically much lower than concentrations causing death of adults, adults may survive but be unable to successfully reproduce. In this event, gradual declines in fish and wildlife populations may occur even though "dead bodies" are not evident.

Certain PCBs also have dioxin-like activity and toxicity (Rice and O'Keefe 1995). Relative toxicity varies with congener and may be expressed as toxicity relative to 2,3,7,8-TCDD, or toxic equivalency factors (TEFs). TEFs as low as 10 to 20 parts per trillion may adversely affect avian reproduction. As such, environmental risk of PCB may be driven by TEFs of specific PCB compounds.

Sediment Concerns

As you know, PCBs have a low solubility in water and tend to collect in sediments in aquatic systems, particularly sediments rich in organic carbon. Low levels of PCBs in sediment have been associated with adversely effect to aquatic organisms. Sediment-dwelling organisms may begin to exhibit adverse effects at total PCB concentrations in sediment as low as 0.003 ppm (Long and Morgan 1991). The consensus-based threshold effect concentration for freshwater sediments is 0.035 ppm (MacDonald et al. 2000). Below this point the authors indicate that direct toxic effects are unlikely to occur. The midrange effect concentration, or that level at which adverse effects frequently occur, is 0.34 ppm and the extreme effect concentration, or that level at which adverse effects usually or always occur, is 1.6 ppm. Persaud et al. (1993) identify a "severe effect level" of 0.53 ppm. The severe effect level is defined as a concentration at which the health of sediment-dwelling organisms will likely be affected. The authors of all of these studies caution that the derivation of sediment effect concentrations are based on direct toxic effects and do not consider bioaccumulation or food chain-mediated exposure and effects.

Alabama Human Consumption Advisories

I've seen reference to two levels at which PCB consumption advisories are issued in AL: 5 and 2 ppm, wet weight. The Solutia Anniston RCRA Report references 2 ppm for fish advisories in the Coosa and cites it as a Alabama Department of Public Health Criterion. The EPA recommends limited consumption for chronic health endpoint at concentrations as low as 0.006 ppm PCB and no consumption at levels as low as 0.2 ppm (EPA 1994). EPA consumption advisories based on cancer risk are substantially lower with limited consumption recommended at PCB concentrations as low as 0.00004 ppm and no consumption at levels as low as 0.002 ppm.

Anyway, I've babbled long enough. I hope this information helps. I definately believe there is a high potential for PCBs from this site to affect fish and wildlife in Alabama. I'd be interested in working with you further on the matter. Give me a call/email if I can provide further information.

Peter

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